The management of the natural marine reserve of the Terres australes françaises (French Southern Lands)

by

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ABSTRACT. - The national marine and terrestrial nature reserve of the Terres australes françaises was created in October 2006. It covers 23 000 km^2 of land and sea and is the largest nature reserve in France. It encompasses 11 693 km^2 of the territorial sea (12 nm from the coast) of Crozet and Kerguelen archipelagos, as well as the entire extent of the territorial seas of Amsterdam and Saint-Paul islands. A management plan has been drafted for this nature reserve, which is managed by the Terres australes et antarctiques françaises (TAAF). Although knowledge still needs to be developed, the marine reserve preserves important natural heritage, such as large feeding areas of high biomass beds of *Macrocystis pyrifera* and *Durvillea antarctica*. The diversity of the fauna, especially fish and marine mammals protected by the reserve also needs to be highlighted (TAAF, 2011). The management plan for all French nature reserves are normally composed of three parts. The first provides a description of the reserve, the second presents the management objectives, and the third outlines monitoring activities. For the TAAF management plan, the first section tries to assemble all data collected in the reserve in the past 30 years. New strong partnerships with the scientific community have made it possible to identify most of the available data and to write an initial synthesis that describes the marine habitats and the species richness in the reserve, particularly in the marine area of Kerguelen. The first part of the management plan clearly underlines the necessity of assembling extra existing data in order to estimate the real value of the protected area and subsequently identify potential threats. This task will be implemented between 2010 and 2015. Parallel to this and according to the management objectives defined in the management plan, flora and fauna inventories will be carried-out. The management plan will be enforced starting 2011, until the next five years. During this time, monitoring and inventories will help establish conclusions of the first five years of management. The national nature reserve status allows the preservation of the terrestrial and coastal ecosystems located inside the reserve, but there is complexity in protecting species whose distribution is wider than the reserves boundaries. For a more global conservation approach, it is important to think of marine management on a bigger scale.

RÉSUMÉ. - La gestion de la réserve marine naturelle des Terres australes françaises (Territoires français austraux).

La réserve naturelle nationale marine et terrestre des Terres australes françaises a été créée en octobre 2006. Couvrant 23 000 km^2 de terre et de mer, c'est la plus grande réserve nationale de France. La réserve marine couvre 11 693 km ^{2} des eaux territoriales (12 mn de la côte) des archipels de Crozet et Kerguelen, ainsi que la totalité de la mer territoriale des îles Amsterdam et Saint-Paul. Un plan de gestion est en cours de finalisation pour cette réserve naturelle gérée par les Terres australes et antarctiques françaises (TAAF). Bien qu'il faille développer la connaissance de cet écosystème marin, la réserve possède un patrimoine naturel largement préservé, comme de nombreuses zones d'alimentation composées de *Macrocystis pyrifera* et *Durvillea antarctica*. La diversité de la faune, en particulier les poissons et les mammifères marins, doit également être soulignée (TAAF, 2011). Tous les plans de gestion des réserves naturelles françaises sont composés de 3 parties. La première constitue une description de la réserve, la deuxième présente les orientations de gestion et la troisième concerne les indicateurs de gestion. Pour le plan de gestion des Terres australes et antarctiques françaises, la première partie a tenté de rassembler toutes les données recueillies dans la réserve au cours des 30 dernières années. De nouveaux partenariats solides avec la communauté scientifique ont permis d'identifier les données disponibles et de rédiger une première synthèse descriptive des habitats marins et de la richesse spécifique associée à la réserve et en particulier dans la partie marine de Kerguelen. Ce document souligne clairement la nécessité de rassembler les données existantes encore non exploitées pour estimer la valeur réelle de cette aire protégée et identifier les menaces potentielles. Ce travail sera effectué entre 2010 et 2015. Parallèlement à cela et selon les orientations de gestion définies dans le plan de gestion, les inventaires de la flore et la faune seront effectués. La mise en œuvre du plan de gestion sera effective en 2011 et ce pour les 5 années suivantes. Durant cette période, la surveillance et les inventaires devraient aider à établir des conclusions au terme de ces 5 premières années de gestion. Le classement en réserve naturelle nationale permet la préservation des écosystèmes terrestres et côtiers situés à l'intérieur de la réserve, mais il reste complexe de protéger les espèces dont la distribution est plus large que les limites de la réserve. Dans une approche plus globale de conservation, il est important de penser à une gestion du milieu marin à une plus vaste échelle.

Key words. - Natural marine reserve - Conservation - Management plan - Inventories.

This article presents the management of the national nature reserve of the French Southern Lands by the French Southern and Antarctic Lands (TAAF), created under an interdepartmental decree in October 2006. A general presentation of the limits and the different protection levels of the reserve are discussed, followed by the regulations of the

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The Kerguelen Plateau: marine ecosystem and fisheries: 293-296.

reserve and its management plan. Finally, it discusses the relevance of the reserve and the consideration by TAAF to establish new Marine Protected Areas (MPAs) in its waters.

Geographical location and regulations of the reserve

Geographical location of the reserve

The reserve, which is both terrestrial and marine, is located in the Subantartic and Subtropical bio-geographical zones. The total extent of the reserve is 2 326 000 ha, of which the marine area represents over 1 670 000 ha. The reserve covers all of the terrestrial parts of the archipelagos of Kerguelen and Crozet as well as the islands of Saint Paul and Amsterdam. It is the biggest French nature reserve and the whole extent of the reserve was classified as a Ramsar site in 2008.

This article will specifically discuss the marine Subantarctic zone and especially Kerguelen.

Kerguelen archipelago

The Kerguelen archipelago is composed of one main island and over 300 small islands, with a total coastline of 2 800 km. Kerguelen is located on a 100 495 km^2 continental plateau shared with Heard and McDonald Islands (Australia). The total protected area of Kerguelen is divided between 7 200 km^2 of land and 4 971 km^2 of sea, and various separate parts of the territorial waters form the marine reserve.

Crozet archipelago

Crozet archipelago is composed of five volcanic islands linked by a peri-insular plateau of 14 955 km^2. The total reserve area of Crozet is divided between 332 km^2 of land and 6 722 km^2 of sea. The marine part of the reserve covers the territorial waters of Cochons, Apôtres, Pingouins and Est Islands, but not the territorial waters of Possession Island.

Amsterdam and Saint Paul Islands

The entire territorial waters of Saint Paul and Amsterdam are classified as a marine reserve.

Protection status of the French Southern Lands reserve

The interdepartmental decree that created the reserve in October 2006, defines its legislative framework and the institutions in charge of its management. It specifies that the entire marine reserve is submitted to a unique type of protection; as such, three levels of protection (normal area, area reserved to science activities and strictly forbidden area) have been established for the terrestrial reserve, in order to regulate the activities that take place on the islands (Fig. 1). It also stipulates that a management plan must be written within three years of the establishment of the reserve. TAAF is the managing organization for the reserve and is in charge of drafting the management plan and implementing management measures.

TAAF is assisted by its advisory council and the Polar Environment Committee that constitutes the scientific council for the reserve.

General regulations in the marine reserve

General conditions exist in the reserve, as follows: fishing may be controlled or forbidden by the prefect, high commissioner of TAAF; it is forbidden to destroy, mutilate or capture cetaceans; and outside the authorized anchorage points, access for ships within the reserve is limited to simply sailing through.

Many native species in TAAF are protected by national regulations: all cetaceans and four pinnipeds (*Arctocephalus gazella* (Peters, 1875), *Arctocephalus tropicalis* (Gray, 1872), *Mirounga leonina* (Linnaeus, 1758), *Hydrurga leptonyx* (Blainville, 1820) since 1995 and all birds since 1998.

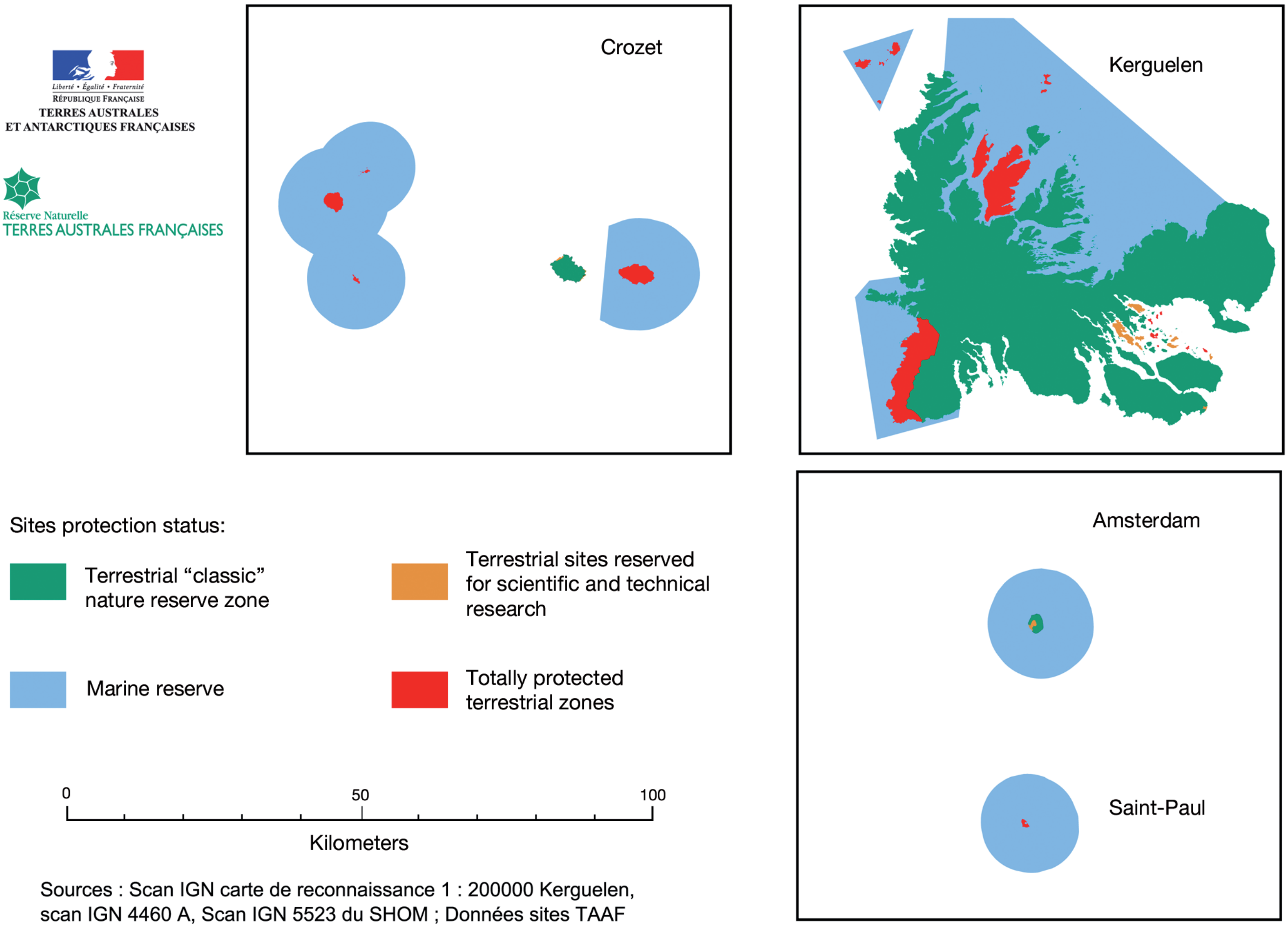
Fishing regulations within the reserve

Two distinct regulations have been established within the reserve. Fishing activities are forbidden in the territorial waters of Crozet and Kerguelen, which include the marine reserve, but are allowed and regulated in the marine reserve of Amsterdam and Saint Paul. As advised by the National Museum of Natural History (Muséum national d'Histoire naturelle, MNHN, Paris) and concerned perspective of different French ministries, a fishing quota must be established every year for four species, the rock lobster *Jasus paulensis* (Heller, 1862) and three species of fish *Polyprion oxygeneios* (Schneider & Forster, 1801), *Hyperoglyphe antarctica* (Carmichael, 1819) and *Latris lineata* (Forster, 1801). A decree defines the technical prescriptions for these fisheries.

The French Navy and the local government body in charge of marine affairs are commissioned to control illegal fisheries in the French exclusive economic zone (EEZ). Monitoring is done through the use of navy ships and satellite tracking, with assistance from the *Oceanic Viking*, the armed patrol vessel of the Australian Customs. All authorized vessels are likewise satellite tracked. TAAF is in charge of managing and controlling this fishery with scientific advice from MNHN.

Authorization of scientific programs in the reserve

TAAF follows the progress of all research programs in the reserve. Applications for research programs are validated by the scientific council of the French Polar Institute (IPEV), and checked by TAAF for comprehensiveness before sending them to a regulation committee composed of the National Council for the Protection of Nature and the Polar Environment Council. The committee evaluates the programs as authorized, to be modified, or unauthorized. This way, TAAF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République Française
TERRES AUSTRALES
ET ANTARCTIQUES FRANÇAISES
Réserve Naturelle
TERRES AUSTRALES FRANÇAISES
Crozet
Kerguelen
Amsterdam
Saint-Paul
Sites protection status:
🟩 Terrestrial "classic" nature reserve zone
🟧 Terrestrial sites reserved for scientific and technical research
🟦 Marine reserve
🟥 Totally protected terrestrial zones
0
50
100
Kilometers

Sources : Scan IGN carte de reconnaissance 1 : 200000 Kerguelen, scan IGN 4460 A, Scan IGN 5523 du SHOM ; Données sites TAAF

Figure 1. - Levels of protection of the terrestrial and marine national nature reserve of the French Southern Lands.

ascertains that all programs conducted in the reserve respect both ethics and regulations.

The management of the marine reserve

In the establishment of a marine reserve, the first step is the preparation of a management plan. In France, the management plan of a nature reserve is three-fold: Part A is an assessment of all the knowledge acquired to-date and the definition of the management objectives; Part B stipulates the management strategy for the next five years; and Part C defines the indicators for evaluating the management plan.

The second step is the implementation of the policies defined in the management plan.

Part A of the management plan

Numerous research institutions have collaborated with TAAF to collect available data; for example, MNHN has collaborated with TAAF on the area of marine science. Part A highlights that the reserve's heritage worth is invaluable; most of the existing data concerning the marine environment still needs to be identified, assembled and synthesized; and further studies need to be conducted in order to identify the value and stakes of the marine reserve.

Despite the lack of data, distinct qualities have been identified that prove the heritage value of the Kerguelen marine reserve. The beds of Durvillea kelp [*Durvillea antarctica* (Hariot, 1892)] and giant kelp [*Macrocystis pyrifera* (Agardh, 1820)] that line the coasts of Kerguelen and Crozet are significant habitats, protecting coastlines from erosion; the giant kelp (*M. pyrifera*) shelters *two-thirds* of the benthic marine species of the peri-insular fauna of Kerguelen and Crozet. Roughly 200 species of invertebrates rely on these algae, as areas for reproduction, nursing or shelter against predators. This habitat is also a nursery for many fish species of the peri-insular plateau. Kerguelen is the only island of the Southern Indian Ocean to possess fjords. Some of these fjords are extensions of marine canyons and are important feeding and nursing grounds for many species. The endemism rate of the benthic fauna is globally high; for example, an endemic mussel species has been identified in the Gulf of Morbihan. In the marine reserves of Crozet and Kerguelen, 125 fish species are known, including two species lacking haemoglobin, the Mackerel icefish (*Champsocephalus gunnari* (Lönnberg, 1905)) and the endemic Unicorn icefish (*Channichthys rhinoceratus* (Richardson, 1844)). Lastly, one marine mammal sub-species is endemic, the Commerson's dolphin [*Cephalorhyncus commersonii* (Lacépède, 1804)] (TAAF, 2011).

Part B of the management plan

Part B concludes that a lot of existing data still need to be assembled and that new research programs related to conservation must be initiated. Pursuing scientific programs in the reserve will allow better evaluation of the natural heritage values and the adoption of the management plan. This explains the collaborative significance between TAAF and the scientific institutions.

It is likewise important to mention the signing of an agreement in 2009 between TAAF and IPEV to develop new research programs related to conservation. TAAF is also signing agreements with marine laboratories to acquire better knowledge of benthos, fishes and top predators in the reserve and the Kerguelen EEZ.

The main research agenda that have been identified in part B of the management plan for the next five years are: completion of the inventory of all existing data (already started in part A of the management plan); acquire better understanding of the marine habitats (kelp beds, mussel beds, fjords); and to map them using video and sampling methods. It would also be interesting to map certain identified species and populations (like fish or invertebrates); gain more knowledge of the importance of the reserve for fish reproduction and juvenile stages; finalize the programs concerning the spatial distribution of seabirds and sea mammals inside and outside the reserve; acquire more knowledge about the cetaceans present in the reserve, more specifically killer whales (Saint Paul and Amsterdam) and their interactions with fisheries (Crozet) and the endemic Commerson's dolphin (Kerguelen).

Part C of the management plan

Part C outlines the indicators for the evaluation of the management plan. The management plan will be implemented on January 2011.

Relevance of the marine reserve

It clearly appears that many species have life cycles that are geographically wider than the reserve (TAAF, 2011). The major problem is that these species and populations may be subjected to anthropogenic pressures outside of the reserve. The two most obvious examples are the Killer whales' interactions with fisheries in Crozet, and bird mortality due to fisheries. The scientific advances concerning these problems were exhaustively presented during the *1st international Science Symposium on the Kerguelen Plateau* (Concarneau, France, April 2010).

Going towards new MPAs

CCAMLR has led bioregionalization programs in the Southern Ocean based on abiotic factors and sea surface chlorophyll data. The results have indicated the peri-insular plateau of Kerguelen and Heard as a potential zone for the creation of an MPA (SC-CAMLR, 2007).

Through this initiative, led by the CCAMLR, with respect to its international commitments, France is considering the creation of new MPAs.

The peri-insular plateau of Kerguelen has been identified by scientists as very important for marine biodiversity. The pioneering results of these studies have been presented during the symposium.

TAAF sustainably manages the fisheries in the EEZ and is considering the extension of protected zones. The creation of an MPA would ensure long term sustainable fisheries and the preservation of marine biodiversity. However, TAAF will wait for the final conclusions of the scientific studies conducted to be able to decide whether or not to create an MPA. All the scientific data will have to be assembled in order to define precise conservation zones that will be classified as a priority. Further, it will help decide on regulations and levels of protection.

Acknowledgements. - The authors thank Zoë Glénard for her help in the translation.

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